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APPLICATION NUMBER 057 765,046	FILING DATE 11/15/96	FIRST NAMED APPLICANT TABATA	ATTY. DOCKET NO. T 8279.146USWO
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11M1/1117
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EXAMINER

VANDY T	PAPER NUMBER
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1103

DATE MAILED: 11/17/97

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

OFFICE ACTION SUMMARY

- ☐ Responsive to communication(s) filed on _____
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 D.C. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire THREE month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

- ☒ Claim(s) 1-14 is/are pending in the application.
Of the above, claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-14 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☒ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been received.
- ☐ received in Application No. (Series Code/Serial Number) _____
- ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

- ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- ☒ Notice of Reference Cited, PTO-892
- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 3,4
- ☐ Interview Summary, PTO-413
- ☒ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Notice of Informal Patent Application, PTO-152

--SEE OFFICE ACTION ON THE FOLLOWING PAGES--

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DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

a) The following is a quotation of 37 CFR 1.71(a)-(c):

(a) The specification must include a written description of the invention or discovery and of the manner and process of making and using the same, and is required to be in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which the invention or discovery appertains, or with which it is most nearly connected, to make and use the same.

(b) The specification must set forth the precise invention for which a patent is solicited, in such manner as to distinguish it from other inventions and from what is old. It must describe completely a specific embodiment of the process, machine, manufacture, composition of matter or improvement invented, and must explain the mode of operation or principle whenever applicable. The best mode contemplated by the inventor of carrying out his invention must be set forth.

© In the case of an improvement, the specification must particularly point out the part or parts of the process, machine, manufacture, or composition of matter to which the improvement relates, and the description should be confined to the specific improvement and to such parts as necessarily cooperate with it or as may be necessary to a complete understanding or description of it.

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The specification is objected to under 37 CFR 1.71 because the written description of the invention is not in such full, clear, concise and exact terms as to enable the person having ordinary skill in the art to make and use the same.

Page 4 lines 20-27 sets forth that the crystalline metallosilicate has 'straight channels of oxygen 8-ring or larger section, directed in at least two different dimensional directions', but the specification does not set forth how the straight channels can be oriented in at least two different dimensions and metallosilicates do not contain rings of oxygen atoms bound to each other in the manner that the language suggests.

The specification does not set forth if 'oxygen 8-ring' means that a cross sectional slice of the channel is a geometric ring formed by the relative positions of eight oxygen atoms, or has some other meaning.

Further, the specification on page 4 lines 20-27 sets forth that the straight channels 'communicate' with each other via oxygen 8-ring or larger micropores, but the specification does not clearly set forth what this 'communication' involves or entails.

- b) The phrase "channels of particular structure formed in the crystalline metallosilicate" mentioned in lines 2 and 3 in the abstract is objected to because it does not particularly point out what the channel structure is and how it distinguishes from the structure of any other channel.
- c) The information citation to the literature reference mentioned on page 2 lines 6-8 is objected to as being incomplete in as much as the journal number, the title of the article and the publication date of the article is missing.

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Claim Rejections - 35 USC § 112

Claims 1 and 9 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1 and 9 set forth that the crystalline metallosilicate has 'straight channels of oxygen 8-ring or larger section oriented in at least two different dimensional directions', but the claims do not set forth how the straight channels can be oriented in at least two different dimensions and metallosilicates do not contain rings of oxygen atoms bound to each other in the manner that the claim language suggests.

It appears that the applicants may have intended to recite that the crystal structure of the metallosilicate contains tunnels wherein the walls of said tunnels are constructed of a plurality of adjacent rings formed by the positions at least 8 oxygen atoms relative to each other and wherein the crystal habit of the metallosilicate gives the appearance of a 'side by side' arrangement of said adjacent rings, thus forming said tunnels, but neither the claims or the specification recite this.

Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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a) Claims 1 and 9 set forth that the crystalline metallosilicate has 'straight channels of oxygen 8-ring or larger section oriented in at least two different dimensional directions', but the claims do not set forth how the straight channels can be oriented in at least two different dimensions and metallosilicates do not contain rings of oxygen atoms bound to each other in the manner that the claim language suggests.

It appears that the applicants may have intended to recite that the crystal structure of the metallosilicate contains tunnels wherein the walls of said tunnels are constructed of a plurality of adjacent rings formed by the positions at least 8 oxygen atoms relative to each other and wherein the crystal habit of the metallosilicate gives the appearance of a 'side by side' arrangement of said adjacent rings, thus forming said tunnels.

b) Claims 1 and 9 set forth that the straight channels 'communicate' with each other via oxygen 8-ring or larger micropores, but the specification does not clearly set forth what this 'communication' involves or entails.

c) In claim 9 lines 2 and 3, the "by" portion of the phrase "excessive amount of oxygen by hydrocarbons having two or larger number of carbons" raises the question of whether or not the oxygen is atomic oxygen that is chemically bound within the hydrocarbons (such as the oxygen within ethanol) or molecular oxygen.

d) In claim 13, the intention and meaning of the phrase "wherein 90% or more of the hydrocarbons calculated in terms of methane contained in the exhaust gas" is vague and indefinite.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 148 USPQ 459, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or unobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

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The person having "ordinary skill in the art" has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this application reasonably reflect this level of skill.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. patent 5,149,512 to Li et al. in view of International application no. WO 94/01365 to Dessau et al.

The BRIEF SUMMARY OF THE INVENTION set forth in the Li et al. patent describes a catalyst and process for catalytically removing nitrogen oxides out of an oxygen-rich exhaust gas that may result from the combustion of methane fuel by contacting the oxygen-rich nitrogen oxides-contaminated exhaust gas with methane reductant over crystalline zeolite that may be exchanged with cobalt under conditions convert the nitrogen oxides into gaseous nitrogen, as set forth in at least applicants' claims 1, 3, 9, 13 and 14.

The limitations of applicants' claim 2 describing the average diameter of the metallosilicate particles are noted, but are limitations that are submitted to be obvious to one of ordinary skill in the art at the time the invention was made notwithstanding the lack of a literal description in the Li et al. patent of the average diameter of their zeolite particles because it is expected that the same cobalt exchanged beta zeolite used to remove nitrogen oxides out of the same exhaust gas inherently has the same average diameter of zeolite particles and no perceptible distinction is seen between the average diameter of the applicants' and Li et al.s' cobalt exchanged metallosilicates.

The difference between applicants' claims 1 and 9 and this Li et al. patent is that claims 1 and 9 recite that the metallosilicates have straight channels of oxygen 8-ring or larger section

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oriented in at least two different dimensional directions, said straight channels communicating with each other via oxygen 8-ring or larger macropores, the straight channels in at least one of said at least two different dimensional directions having oxygen 10-ring or larger section.

It is submitted that this difference would have been obvious to one of ordinary skill in the art at the time the invention was made, namely to set forth that the metallosilicates have straight channels of oxygen 8-ring or larger section oriented in at least two different dimensional directions, said straight channels communicating with each other via oxygen 8-ring or larger macropores, the straight channels in at least one of said at least two different dimensional directions having oxygen 10-ring or larger section as set forth in applicants' claims 1 and 9 into the process of the Li et al. patent because the description of the same cobalt exchanged zeolite used in the applicants' invention and the Li et al. invention does not make for a materially different zeolite. Note that the cobalt exchanged beta zeolite set forth in run 16 in Table 2 of the Li et al. patent does not distinguish from the applicants' cobalt exchanged BEA metallosilicate set forth in applicants' claims 4, 10 and 14.

Note that col. 3 lines 50-55 of the Li et al. patent sets forth that zeolites used have a silicon to aluminum mole ratio of greater than or equal to 2.5 and that col. 7 lines 46-54 of the Li et al. patent teaches that the zeolite may be exchanged with cobalt in an amount that may range from 0.01 to 15 weight percent based on the total weight of the metal exchanged catalyst, which is submitted to make for silica/alumina mole ratios and cobalt/ aluminum mole ratios that are not distinct from those reported in applicants' claims 5, 10, 11, 12 and 14.

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The difference between the Li et al. patent and the applicants' claims is that applicants' claims 6-9, 11, 12 and 14 call for substituting a part of the silicon with titanium and for substituting part of the aluminum with boron in the metallosilicate.

The Dessau et al. application on page 2 lines 16-20 teaches that it is recognized that the silicon and aluminum atoms in zeolites may be replaced in whole or in part with other elements. Particularly, germanium is an art recognized substitute for silicon and boron, chromium, iron and gallium are art recognized replacements for aluminum. Further, the bottom of page 5 of this Dessau et al. application teaches a zeolite that may contain titanium and boron, in the same manner required in applicants' claims 5, 10-12 and 14.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace part of the aluminum with boron and part of the silicon with titanium in the metallosilicate as called for in applicants' claims 5, 10-12 and 14 into the composition and process of the Li et al. patent because the page 2 lines 16-20 and the bottom of page 5 of the Dessau et al. application fairly suggest that titanium and boron would be art recognized substitutes for the silicon and aluminum in the metallosilicates and also because page 4 lines 21-26 of the Dessau et al. application fairly teaches that such 'metal substituted' metallosilicates are useful for catalytically converting nitrogen oxides in exhaust gas - the same field of endeavor as the invention of the applicants' claims and the Li et al. patent.

The following references are made of record:

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"Catalytic reduction of nitrogen oxides with methane. . ." by Armor et al. teaching the use of a cobalt exchanged ZSM-5 zeolite to catalytically promote the reduction of nitrogen oxides in a gas with methane reducing agent;

U. S. patent 5,260,043 teaching the catalytic reduction of nitrogen oxides using methane;

U. S. patent 4,491,637 teaching cobalt in oxidic form on a zeolite carrier, and

Japan patent document no. 6-210,171 A teaching a denitration catalyst containing diboron trioxide, silica and alumina.

Any inquiry concerning this communication should be directed to Timothy C. Vanoy at telephone number (703) 308- 2540.



Timothy C. Vanoy/tcv

31 October 1997



GARY P. STRAUB
PRIMARY PATENT EXAMINER
ART UNIT 113